

Patent Claims

1. Wear-resistant coating, in particular erosion-resistant coating applied to a surface of a component that is exposed to fluid loads, in particular a gas turbine component whose surface is to be protected, whereby the wear-resistant coating is made of one or more multilayer systems applied repeatedly to the surface to be coated, characterized in that each of the multilayer systems (15, 16, 21) which is applied once or repeatedly has at least four different layers (17, 18, 19, 20), whereby the first layer (17) facing the surface (14) that is to be coated of each multilayer system is made of a metallic material adapted to the composition of the component surface that is to be coated, whereby a second layer (18) applied to the first layer (17) of each multilayer system is made of a metal alloy material that is adapted to the composition of the component surface to be coated, whereby a third layer (19) to be applied to the second layer (18) of each multilayer system is made of a gradated metal-ceramic material and a fourth layer (20) applied to the third layer (19) of each multilayer system is made of a nanostructured ceramic material.
2. Wear-resistant coating according to Claim 1, characterized in that each of the multilayer systems (15, 16, 21) applied repeatedly has the same layer structure.
3. Wear-resistant coating according to Claim 1 or 2, characterized in that the first layer (17) of each multilayer system in the case of a component made of a nickel-based material or a cobalt-based material or an iron-based material is made of a nickel material or a cobalt material.

4. Wear-resistant coating according to any one or more of Claims 1 through 3, characterized in that the second layer (18) of each multilayer system in the case of a component made of a nickel-based material or cobalt-based material or iron-based material is made of a nickel alloy material, preferably an NiCr material or a cobalt alloy material or an iron alloy material.
5. Wear-resistant coating according to any one or more of Claims 1 through 4, characterized in that the third layer (19) of each multilayer system in the case of a component made of a nickel-based material or a cobalt-based material or an iron-based material is made of CrN_{1-x} material.
6. Wear-resistant coating according to any one or more of Claims 1 through 5, characterized in that the fourth layer (20) of each multilayer system is formed from a component made of a CrN material and formed from a nickel-based material or a cobalt-based material or an iron-based material and nanostructured.
7. Wear-resistant coating according to Claim 1 or 2, characterized in that the first layer (17) of each multilayer system in the case of a component made of a titanium-based material is formed from a titanium material or a platinum material or a palladium material.
8. Wear-resistant coating according to Claim 7, characterized in that the second layer (18) of each multilayer system in the case of a component made of a titanium-based material is formed from a titanium alloy material or an aluminum alloy material, preferably a TiCrAl material or a CuAlCr material.

9. Wear-resistant coating according to Claim 7 or 8, characterized in that the third layer (19) of each multilayer system in a component made of a titanium-based material is formed from a CrAlN_{1-x} material or a TiAlN_{1-x} material.
10. Wear-resistant coating according to any one or more of Claims 7 through 9, characterized in that the fourth layer (20) of each multilayer system in a component formed from a titanium-based material is made of a CrAlN material or a TiAlN material or a TiAlSiN material or a TiN/AlN material and is nanostructured.
11. Wear-resistant coating according to any one or more of Claims 1 through 10, characterized in that the total layer thickness of the layers (17, 18, 19, 20) of each multilayer system is less than 15 µm.
12. Wear-resistant coating according to any one or more of Claims 1 through 11, characterized in that several such multilayer systems are applied repeatedly to the surface (14) of the component that is exposed to fluidic loads (11), whereby an adhesive layer (22) is applied between the surface (14) of the component (11) and the first multilayer system (15) adjacent to the surface (14).
13. Component, in particular a gas turbine component, having a wear-resistant coating, especially an erosion-resistant coating which is applied to a surface of the component that is exposed to fluidic loads and is to be protected, the wear-resistant coating (13) being made of one or more multilayer systems (15, 16, 21) applied repeatedly to the surface

(14) to be coated, characterized in that each of the multilayer systems applied once or repeatedly has at least four different layers (17, 18, 19, 20); whereby a first layer (17) facing the surface (14) to be coated in each multilayer system consists of a metallic material adapted to the composition of the component surface to be coated; whereby a second layer (18) of each multilayer system applied to the first layer (17) consists of a metal alloy material applied to the composition of the component surface; whereby a third layer (19) applied to the second layer (18) of each multilayer system is made of a gradated metal ceramic material; and whereby a fourth layer (20) applied to the third layer (19) of each multilayer system consists of a nanostructured ceramic material.

14. Component according to Claim 13, characterized in that the wear-resistant coating (13) is formed according to one or more of Claims 2 through 12.
15. Component according to Claim 13 or 14, characterized in that said component is designed as a housing or a guide vane or rotor blade or a guide vane segment or a rotor blade segment or an integrally bladed rotor of a gas turbine, in particular an aircraft engine.